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participate in the work. Certainly, then, personality can have but a minimum influence in determining the final grade—that is, if we except the influence of the personality of the milk producer and the milk dealer in each conducting his business as it should be conducted.

As the records of the department have not been arranged with a view to the grading of milk in the manner proposed in this article, the computing of milk grades will for a time be troublesome. The rearrangement of the system of record keeping in such a manner as to facilitate in the future the computation of milk grades will involve, however, no great difficulty. A tentative arrangement is shown in the specimen gradings which appear on page 338, figures from actual records having been transferred to the form of record which it is proposed to keep. Figures are to be entered on such a proposed record daily as they come in from the inspectors and from the laboratories, but it will be necessary to compute ratings for the milk only when request is made, or otherwise at stated intervals, say monthly, or quarterly. The results of such periodical computations should be communicated to the milk dealer primarily interested, for his information and guidance, and such a course will be followed if clerical assistance be available for that purpose.

While the grading of milk in the manner described in this article will consume some time and, therefore, add to the cost of the milk inspection service, it will make of practical value many reports and figures now collected at a considerable cost, and then buried in the official records without affording a basis for intelligent action by the milk supervising authority or, what is even more important, for intelligent action by the consuming public, which, after all, is in supreme control of the milk situation.

SMALLPOX IN KENTUCKY.

A REPORT OF AN INVESTIGATION OF THE PREVALENCE OF THE DISEASE AT POINTS ON THE GREEN RIVER.

By TALIAFERRO CLARK, Surgeon, United States Public Health Service.

At the request of the Kentucky State Board of Health, I was directed by the Surgeon General to proceed to points on the Green River to investigate the smallpox situation and to advise with local health authorities relative to its control.

Leaving Evansville, Ind., February 3, 1913, I visited the following counties: Hopkins, McLean, Butler, Ohio, Grayson, Muhlenburg, and Daviess.

The investigation was completed at Owensboro, Ky., February 10, 1913.

NATURE OF THE OUTBREAK.

The present outbreak of smallpox in Kentucky is characterized by its remarkable mildness. The eruption in the vast majority of the cases is scant. The onset of the disease is attended with a feeling of malaise for two or three days, with slight fever, rather severe headache and backache. In children the onset is often associated with an attack of vomiting. On the appearance of the eruption these symptoms subside and the patients feel as well as ever. To such a degree is this the case that children do not remain in the house, but play out of doors, and adults are tempted to and even do evade quarantine.

Some severe cases with grave prognosis have been reported, but these are few in number. In fact, so mild is the type of smallpox in this epidemic that no apprehension is felt by the people, which adds not a little to the burden of the health authorities in the enforcement of quarantine regulations.

DURATION OF THE OUTBREAK.

Sporadic cases of smallpox have been observed at points on the Green River and vicinity since last spring. One case was reported at Owensboro in April, 1912. About two years ago an outbreak occurred at Millerstown, Grayson County, with the development of 50 cases of smallpox, which was at first mistaken for chickenpox.

There is no doubt that smallpox has been prevailing at places near Green River for a year or more, and possibly much longer. Many of these cases were not reported nor properly diagnosed by reason of the mildness of the attack.

A negro boatman, now in the Marine Hospital, Evansville, Ind., states that he was removed from a river boat last summer, while suffering with smallpox, and isolated at Morgantown, Butler County, Ky.; and Dr. Tichnor reported that 20 cases of smallpox occurred in 7 families at Point Pleasant, Hartford, and Centertown, Ohio County, during March and April, 1912.

ORIGIN OF THE EPIDEMIC.

By reason of the mildness of the disease in the present epidemic the earlier cases were unrecognized and unreported. Hence no reliable data, on account of lapse of time since the beginning of the outbreak, could be obtained pointing to the original source of infection.

Many patients in Butler County, mostly young laboring men, gave the source of infection as the Illinois Central Railroad.

It appears that the Illinois Central Railroad operates a work train hauling crossties from various points in Grayson, Ohio, and other

counties within the State. Attached to this train are several boarding cars in which these men claim cases of smallpox have developed. As soon as these facts were ascertained and the train was located the secretary of the State board of health was communicated with by telephone and the situation presented for his control. This train operates wholly within the State of Kentucky and is not engaged in interstate traffic.

The first cases are claimed to have been imported into Obio and Grayson Counties from Louisville, Owensboro, and Evansville, but no definite proof of this assertion could be obtained.

The only case reported in McLean County was contracted in Daviess County.

PREVALENCE.

Ashbysburg, Hopkins County.—Only two cases of smallpox developed at this point, one in a child of 6 years of age, January 2, 1913, and the other in an adult, January 10, 1913. Both cases were promptly isolated and had recovered before my arrival. The source of infection of these cases could not be determined.

About January 13, nearly 1,200 refugees from homes flooded by the overflow of Green River were congregated on the hills in and about Ashbysburg. Three or four families were crowded into one house—conditions most favorable for a spread of smallpox—yet no other case developed.

McLean County.—Dr. Hugh Gates, secretary of the county board of health, reported but one case of smallpox in McLean County, which developed at Beach Grove February 5, 1913. This case contracted the disease in Daviess County, and is in strict quarantine.

Butler County.—Dr. Austin, secretary of the county board of health, reported 44 cases of smallpox in the vicinity of Tilford, Butler County, near the Grayson County line. These cases represent 19 infected houses. At Aberdeen, $1\frac{1}{2}$ miles from Morgantown, on the north shore of Green River, is one family with five cases of smallpox. Strict quarantine measures are being enforced and the Butler County grand jury returned indictments against 14 persons on February 7 for violation of quarantine ordinances. The Kentucky law provides a penalty of \$100 to \$1,000 for such violation. This action of the Butler County grand jury will very probably result in a much closer observance of quarantine. The first case of smallpox was reported November 14, 1912, the last February 6, 1913. Many of the patients claim the disease was contracted at points along the Illinois Central Railroad in Grayson County.

Ohio County.—Smallpox has been reported from the following places in Ohio County:

Place.	Number cases.	Number families.	First case.	Last case.
Centertown.....	30	10	Jan. 15, 1913	Feb. 8, 1913
Olaton.....	18	6		Feb. 5, 1913
Pleasant Ridge.....	6	4	Jan. 10, 1913	Jan. 28, 1913
Rockport.....	23	11	Jan. 15, 1913	Feb. 8, 1913
Taylor's Mine.....	7	4	Nov., 1912	Dec., 1912
Total.....	84	35		

Grayson County.—Smallpox was reported from the following points:

Place.	Number cases.	Number families.	First case.	Last case.
Clarkson.....	5	3	Dec. 15, 1912	Feb. 3, 1913
Goff's Crossing.....	6	6	Jan. 20, 1913	Feb. 5, 1913
Leitchfield.....	15	6	Dec. 27, 1912	Jan. 23, 1913
Spring Lick.....	6	6		
West Clifty.....	10	3	Dec. 15, 1912	Jan. 29, 1913
Yeaman.....	3	1		
Total.....	55	25		

Muhlenburg County.—At Central City Dr. J. M. Ferguson, city health officer, reported four cases of smallpox. The first case developed December 18, 1912, and the last January 20, 1913. During the first week in January, 1913, one case each was reported from Penrod, Powderly, and Greenville, Muhlenburg County.

Daviess County.—The following cases of smallpox were reported by Dr. J. W. Barnhill, city health officer, Owensboro, Ky.:

Time.	Cases.	Time.	Cases.
April 12, 1912.....	1	November, 1912.....	5
May 1, 1912.....	1	December, 1912.....	9
June, 1912.....	10	January, 1913.....	8
July, 1912.....	6	February (to date of visit).....	2
August, 1912.....	1		
September, 1912.....	2	Total.....	50
October, 1912.....	5		

Dr. L. G. Armendt, county health officer, reported as follows:

Place.	Cases.	Families having cases.	Date of last case.
Byrnes's farm.....	5	1	Nov. 20, 1912
Curdsville.....	6	2	Feb. 5, 1913
Dr. Medlar's farm.....	1	1	Dec. 10, 1912
Knoxville.....	2	1	Jan. 28, 1913
Lewis Station.....	1	1	Jan. 15, 1913
Masonville and vicinity.....	16	5	Feb. 1, 1913
Rome.....	15	4	Jan. 25, 1913
Sutherland.....	10	2	Jan. 1, 1913
Tuck.....	12	3	Jan. 5, 1913
Vicinity of Owensboro.....	4		
Total.....	72	20	

The foregoing reports reveal a rather widespread prevalence of smallpox in the northern section of the Green River watershed. The greatest number of cases were reported from Daviess, Ohio, Grayson, and Butler Counties. The vicinity of the junction of these last three counties was the seat of the greatest smallpox activity, and it likewise offers the greatest obstacles to control, by reason of the hostile attitude of the resident population as regards any measures directed toward that end.

INFLUENCES FAVORING THE SPREAD OF SMALLPOX IN THIS SECTION.

Type of the disease.—Smallpox is so mild in its manifestations during the present outbreak that people are not afraid of it and therefore are disinclined to observe proper precautions to prevent its spread. Especially is this true with respect to vaccination, concealment of cases, and attempts to evade quarantine.

The benign type of the disease is also accountable for the failure to detect the earliest cases. Indeed, smallpox had almost attained the proportion of an epidemic before many physicians diagnosed the disease correctly and commenced reporting cases.

Vaccination.—Fully 90 per cent of the people in the territory included in this survey are unprotected by recent vaccination. Approximately 75 per cent, at least, have never been vaccinated.

At Ashbysburg I examined eight families of flood refugees dwelling in tents, 53 people in all. Of these, 52 had never been vaccinated. One adult had been vaccinated when a small child. Among 30 other people, only 5 had ever been vaccinated, and these not recently.¹

The same lack of vaccination was found at many points visited. This is due to the refusal of these people to be vaccinated. Many, in fact nearly all of them, say they would rather have an attack of smallpox than be vaccinated.

Incomplete quarantine.—In rural communities it is a difficult matter to enforce strict quarantine, especially against a disease of which the people are not afraid. Many instances are reported of cases in the eruptive stage breaking quarantine. The recent indictment of 14 persons for violation of quarantine ordinances by the Butler County grand jury will doubtless put an end to this practice.

Concealment of cases.—The total number of cases of smallpox reported in the course of this survey is only an approximate estimate of the present prevalence of smallpox. In spite of the penalty attached for each offense, under the Kentucky statutes, it is believed many cases of smallpox have been and are now concealed from the health authorities.

¹ Kentucky has a statute requiring all persons to be vaccinated.

Contacts.—The regulations of the Kentucky State Board of Health impose a quarantine of 21 days on all persons who have been exposed to smallpox. Rebellion against this long quarantine caused nearly all “contacts” to conceal the fact of exposure and adds materially to the difficulties attending measures for control of the epidemic.

STOMOXYS CALCITRANS LINN.

A NOTE GIVING A SUMMARY OF ITS LIFE HISTORY.

By M. B. MITZMAIN, Entomologist, Bureau of Agriculture, Philippine Islands.

The recent findings of laboratory workers concerning the possibility of the transmission of poliomyelitis by the stable fly, *Stomoxys calcitrans*, makes of interest the life history of this insect. An account of my two years' experience with this fly has been prepared for publication elsewhere. The following, however, is a brief summary giving the essential features:

SUMMARY OF FACTS ESTABLISHED.

1. The age at which the female begins egg laying has been determined in bred flies as the ninth day.

2. The maximum number of eggs produced by a single *Stomoxys* may be placed at, at least, 632 and possibly 820. As many as 20 depositions are made in the lifetime of a female. The maximum number of eggs deposited at one period was found to be 94.

3. The incubation period for these eggs is 20 to 26 hours at a temperature of 29° C. to 31° C.

4. The larval stage under favorable conditions is usually 7 to 8 days.

5. The imago emerges from the puparium generally in 5 days.

6. The fly of either sex takes its initial bite in 6 to 8 hours after emergence from the puparium. Flies of this species have been observed to feed experimentally on 17 species of vertebrates including man, reptile, bird, and rodent.

7. It has been demonstrated that in feeding on live stock *Stomoxys* probes a wound with its labium from which nonbiting flies draw blood. Surra organisms have been demonstrated in the mouth parts and stomachs of house flies used in experiments in this connection.

8. In considering the longevity of *Stomoxys calcitrans* it has been determined that a female can live a maximum of at least 72 days and a male a period of 94 days.

9. The life cycle of *calcitrans*, as seen by the following chart, varies considerably according to the treatment the young forms receive. Under optimum conditions this is a period of 12 days, but under unfavorable surroundings in light and absence of moisture, the life cycle may be extended to 35 days.